

## CLAIMS

What is claimed is:

1 1. An apparatus for improved shock and vibration isolation of a circuit  
2 component utilizing solder column grid arrays to provide electrical connection to a  
3 base component, the apparatus comprising:

4 (a) a support frame attached to the circuit component and to the base component  
5 which supports the circuit component on the base component; and

6 (b) an isolation material located at a point between the circuit component and the  
7 base component such that a vibration or shock to the base component must  
8 travel through the isolation material prior to reaching the circuit component.

1 2. An apparatus for improved shock and vibration isolation of a circuit  
2 component according to Claim 1, wherein the point between the circuit component  
3 and the base component is at least one of the points between the support frame and  
4 the circuit component, between the support frame and the base component, or  
5 between two components of the support frame.

1 3. An apparatus for improved shock and vibration isolation of a circuit  
2 component according to Claim 1, wherein the isolation material is selected from the  
3 group consisting of polystyrene, visco-elastic polymer and thermo set polyether-  
4 based polyurethane.

1 4. An apparatus for improved shock and vibration isolation of a circuit  
2 component according to Claim 1, wherein an isolation material is additionally  
3 provided between the support frame and an additional component.

1 5. An apparatus for improved shock and vibration isolation of a circuit  
2 component according to Claim 1, wherein the circuit component includes a package  
3 lid and the isolation material is located at a point between the package lid and a  
4 support frame.

1 6. An apparatus for improved shock and vibration isolation of a circuit  
2 component according to Claim 1, wherein the circuit component includes a substrate  
3 and the isolation material is located at a point between the substrate and a support  
4 frame.

1 7. An apparatus for improved shock and vibration isolation of a circuit  
2 component according to Claim 1, wherein the circuit component includes a package  
3 lid, wherein the package lid or the support frame includes a protrusion which  
4 cooperates with a corresponding recess on the other of the package lid or the  
5 support frame, and wherein the isolation material is located between the protrusion  
6 and the recess.

1 8. An apparatus for improved shock and vibration isolation of a CGA integrated  
2 package which utilizes solder column grid arrays to provide electrical connection to a  
3 circuit board and which includes a substrate and a package lid, the apparatus  
4 comprising:

- 5 (a) a support frame attached at an attachment point to the substrate or the  
6 package lid of the integrated package and at a second attachment point to the  
7 circuit board; and  
8 (b) an isolation material located at the attachment point of the support frame to  
9 the substrate or the package lid, or located at the second attachment point of  
10 the support frame to the circuit board such that a vibration or shock to the  
11 circuit board must travel through the isolation material at the attachment point  
12 prior to reaching the integrated circuit.

1 9. An apparatus for improved shock and vibration isolation of a CGA integrated  
2 package according to Claim 8 wherein the isolation material is located at both the  
3 attachment point of the support frame to the substrate or the package lid, and  
4 located at the second attachment point of the support frame to the circuit board such  
5 that a vibration or shock to the circuit board must travel through the isolation material  
6 at the attachment point prior to reaching the CGA integrated package.

1 10. An apparatus for improved shock and vibration isolation of an integrated  
2 package according to Claim 8, wherein the isolation material is selected from the  
3 group consisting of polystyrene, visco-elastic polymer and thermo set polyether-  
4 based polyurethane.

1 11. An apparatus for improved shock and vibration isolation of a CGA integrated  
2 package according to Claim 8, wherein the package lid or the support frame includes  
3 a protrusion which cooperates with a corresponding recess on the other of the  
4 package lid or the support frame, and wherein the isolation material is located  
5 between the protrusion and the recess.

1 12. An apparatus for improved shock and vibration isolation of a CGA integrated  
2 package according to Claim 8, wherein an isolation material is additionally provided  
3 between the support frame and an additional component, and wherein the additional  
4 component is a heat sink.

1 13. An apparatus for improved shock and vibration isolation of a CGA integrated  
2 package according to Claim 8, wherein the support frame is attached to the circuit  
3 board via a screw and the isolation material is located at a point between the screw  
4 and the circuit board.

1 14. A method of supporting a circuit component on a base component and  
2 improving the isolation of the circuit component from any vibration and shock to the  
3 base component, the method comprises the steps of:

- 4 (a) providing a support frame which supports the circuit component and attaches  
5 the circuit component to the base component; and  
6 (b) providing an isolation material at a point between the circuit component and  
7 the base component such that a shock or vibration to the base component  
8 must pass through the isolation material before reaching the circuit  
9 component.

1 15. A method of supporting a circuit component and improving the isolation of the  
2 circuit component from vibration and shock according to Claim 14, wherein the step  
3 of providing isolation material at a point between the circuit component and the base  
4 component includes providing the isolation material at one or more of an attachment  
5 point between the support frame and the circuit component, between the support  
6 frame and the base component, or between two components of the support frame.

1 16. A method of supporting a circuit component and improving the isolation of the  
2 circuit component from vibration and shock according to Claim 14, wherein the step  
3 of providing isolation material includes providing a material selected from the group  
4 consisting of polystyrene, visco-elastic polymer and thermo set polyether-based  
5 polyurethane.

1 17. A method of supporting a circuit component and improving the isolation of the  
2 circuit component from vibration and shock according to Claim 14, further comprising  
3 the step of providing an isolation material between the support frame and an  
4 additional component.

1 18. A method of supporting a circuit component and improving the isolation of the  
2 circuit component from vibration and shock according to Claim 14, wherein the  
3 integrated circuit includes a package lid and the step of providing an isolation  
4 material includes locating the isolation material at a point between the package lid  
5 and a support frame.

1 19. A method of supporting a circuit component and improving the isolation of the  
2 circuit component from vibration and shock according to Claim 14, wherein the circuit  
3 component includes a substrate and the step of providing an isolation material  
4 includes locating the isolation material at a point between the substrate and a  
5 support frame.

1 20. A method of supporting a circuit component and improving the isolation of the  
2 circuit component from vibration and shock according to Claim 14, wherein the circuit  
3 component includes a package lid, wherein the package lid or the support frame  
4 includes a protrusion, and wherein the step of providing a support frame includes  
5 providing a corresponding recess on the other of the package lid or the support  
6 frame which cooperates with the protrusion, and wherein the step of providing  
7 isolation material includes locating the isolation material between the protrusion and  
8 the recess.